

**Figure 1. Amino Acid Sequences of Murine 1A6 and Human Consensus Sequences of Heavy Chain Subgroup III (HumIII) and Light Chain  $\kappa$  Subgroup I (Hum $\kappa$ I).**

**V<sub>H</sub> Domain**

|          |       |              |              |                |             |       |
|----------|-------|--------------|--------------|----------------|-------------|-------|
|          | 1     | 11           | 21           | 31             | 41          |       |
| Mouse1A6 | EVQLQ | QSGAE        | LVKPG        | ASLKL          | SCTAS       | GFNIK |
|          |       | <b>DTYIH</b> | <b>WMKQR</b> | <b>PEQGLEW</b> | <b>I GR</b> |       |
|          | **    | **           | *            | *              | *           | *     |

|        |            |            |            |            |             |  |
|--------|------------|------------|------------|------------|-------------|--|
| HumIII | EVQLVESGGG | LVQPGGSLRL | SCAASGFNFS | -----WVRQA | PGKGLEWVA-- |  |
|--------|------------|------------|------------|------------|-------------|--|

|          |             |            |            |             |               |      |
|----------|-------------|------------|------------|-------------|---------------|------|
|          | 51 a        | 61         | 71         | 81 a bc     | 91            |      |
| Mouse1A6 | IDPANDNTIYD | PKVQ       | GKATMT     | ADTSS NTAYL | QLNSLTSEDTAVY | YCTT |
|          |             | <b>***</b> | <b>***</b> | <b>*</b>    | <b>**</b>     |      |

|        |        |         |      |            |               |      |
|--------|--------|---------|------|------------|---------------|------|
| HumIII | -----A | DSVKGRF | T IS | RDDSKNTAYL | QMNSLRAEDTAVY | YCTT |
|--------|--------|---------|------|------------|---------------|------|

|          |        |      |          |
|----------|--------|------|----------|
|          | 103    | 111  |          |
| Mouse1A6 | SGYWFA | YWQG | TLVT VSS |

|        |           |          |
|--------|-----------|----------|
| HumIII | -----WGQG | TLVT VSS |
|--------|-----------|----------|

**V<sub>L</sub> Domain**

|          |            |            |         |             |                |     |
|----------|------------|------------|---------|-------------|----------------|-----|
|          | 1          | 11         | 21      | 31          | 41             | 51  |
| Mouse1A6 | DIVLTQSPAT | LSVTPGDSVS | LSCRASQ | SIS NNLHWYQ | QKH SESPRLLIKH | ASQ |
|          | **         | **         | ***     | *           | *              | *   |

|                |            |            |          |             |           |         |
|----------------|------------|------------|----------|-------------|-----------|---------|
| Hum $\kappa$ I | DIQMTQSPSS | LSASVGDRVT | ITC----- | -----WYQQKP | GKAPKLLIY | -- ---- |
|----------------|------------|------------|----------|-------------|-----------|---------|

|          |           |            |            |            |            |          |
|----------|-----------|------------|------------|------------|------------|----------|
|          | 61        | 71         | 81         | 91         | 101        |          |
| Mouse1A6 | SISG I PS | RFSGSGSGTD | FTLSINSVET | EDFGMFFCQQ | SNSWPYTFGG | GTKLEIKR |
|          | *         |            | <b>***</b> | <b>***</b> | *          | *        |

|                |         |            |           |             |          |          |
|----------------|---------|------------|-----------|-------------|----------|----------|
| Hum $\kappa$ I | ---GVPS | RFSGSGSGTD | FTLTSSLQP | EDFATYYC--- | -----FGQ | GTKVEIKR |
|----------------|---------|------------|-----------|-------------|----------|----------|

The CDR residues as defined by both Kabat and Chothia are shown in boldface.

Fig. 2A

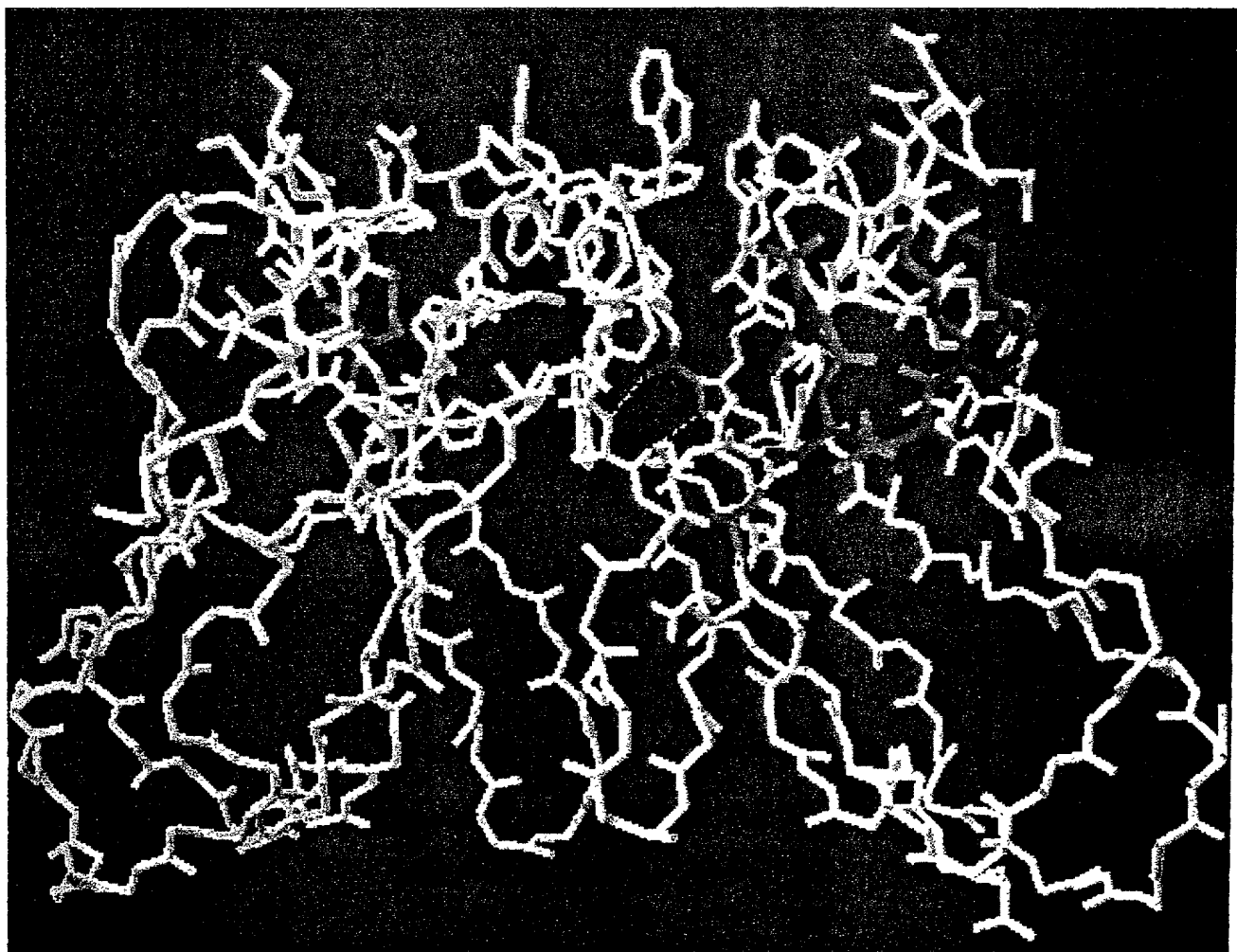


Fig. 2B

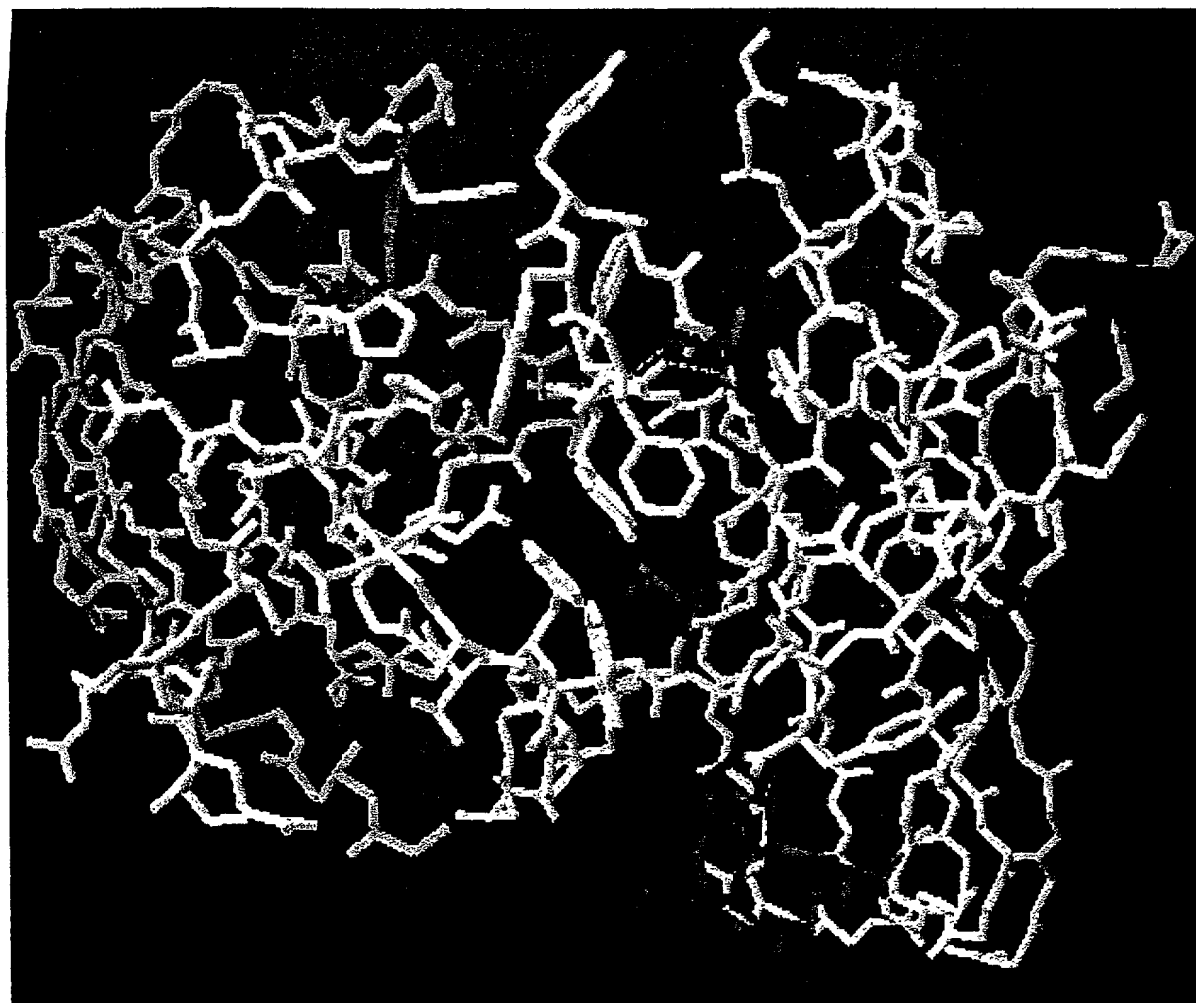
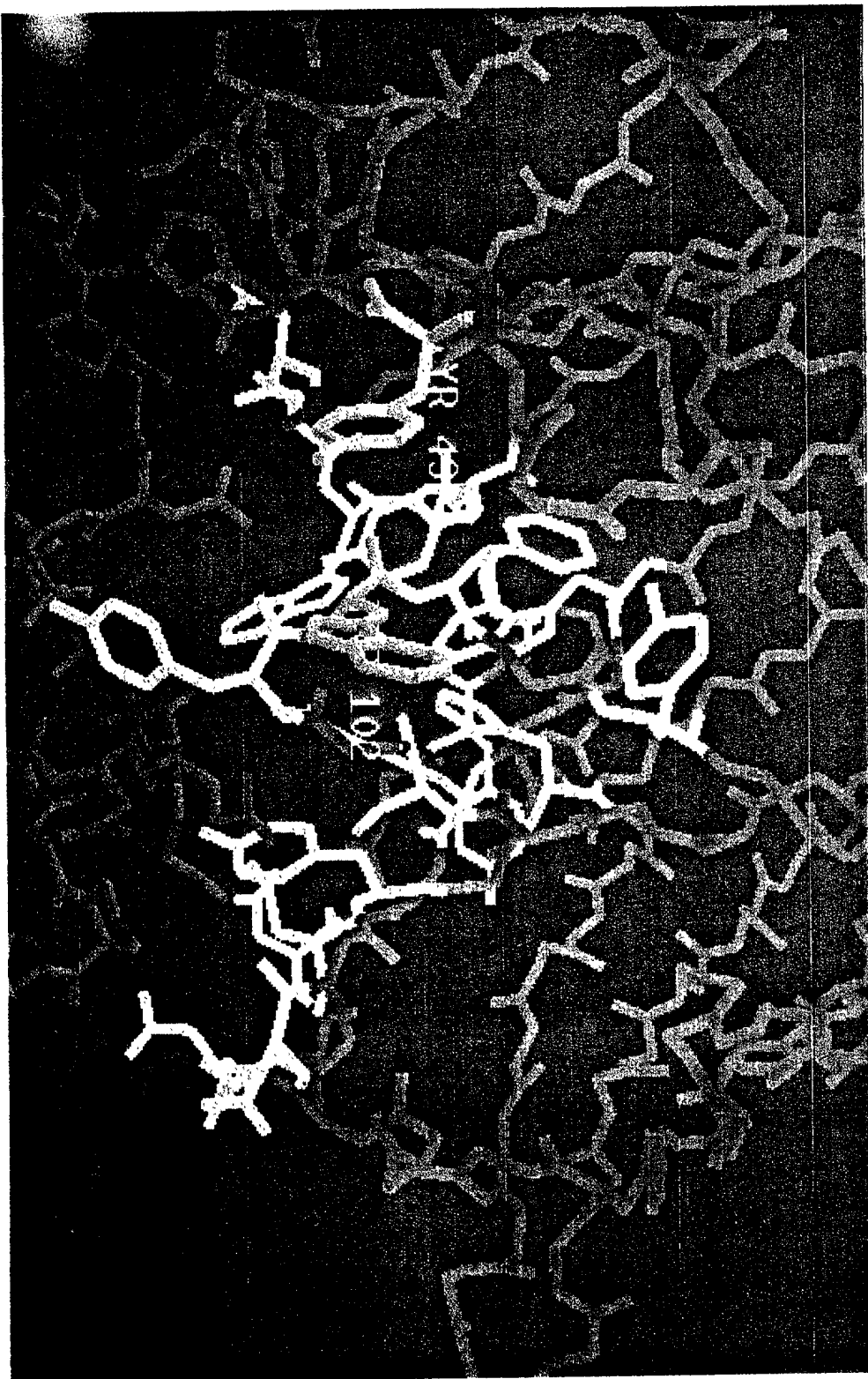


Fig. 2C



**Figure 3. Amino Acid Sequences of Murine 1A6, Humanized 1A6 (Hum19), and Human Consensus Sequences of Heavy Chain Subgroup III (HumIII) and Light Chain  $\kappa$  Subgroup I (Hum $\kappa$ I).**

| <b>V<sub>H</sub> Domain</b> |   |
|-----------------------------|---|
|                             | 1                      11                      21                      31                      41                         |
| Mouse                       | EVQLQQSGAE LVKPGASLKL SCTASGFNIK <b>DTYIHW</b> MKQR PEQGLEWI GR<br>* * * * *  |
| Hum19                       | EVQLVESGGG LVQPGGSLRL SCAASGFNIK <b>DTYIHW</b> VQRQA PGKGLEWVAR   |
| HumIII                      | EVQLVESGGG LVQPGGSLRL SCAASGFNFS -----WVRQA PGKGLEWVA—  |
|                             | 51 a                      61                      71                      81 abc                      91                  |
| Mouse                       | <b>IDPANDNTIYD</b> PKVQGKATMT ADTSS NTAYL QL NSLTSEDTAVY YCT T<br>* * * * *   |
| Hum19                       | <b>IDPANDNTIYA</b> DSVKG RFT IS SDDSKNTAYL QMNSLRAEDTAVY YCTA<br>* * *  |
| HumIII                      | -----A DSVKG RFT IS RDDSKNTAYL QMNSLRAEDTAVY YCTR   |
|                             | 103                      111  |
| Mouse                       | SGYWFA YWGQGT <del>LT</del> VT VSS  |
| Hum19                       | SGYWFA YWGQGT <del>LT</del> VT VSS  |
| HumIII                      | -----WGQGT <del>LT</del> VT VSS   |
| <b>V<sub>L</sub> Domain</b> |   |
|                             | 1                      11                      21                      31                      41                      51 |
| Mouse                       | DIVLTQSPAT LSVTPGDSVS LSCRASQ <del>SI</del> S NNLHWYQ <del>Q</del> KH SESPRLLIKH <b>ASQ</b><br>* * * * *                  |
| Hum19                       | DIQMTQSPSS LSASVGDRVT ITCRASQ <del>SI</del> S NNLHWYQ <del>Q</del> KP GKAPKLLIYH <b>ASQ</b>                               |
| Hum $\kappa$ I              | DIQMTQSPSS LSASVGDRVT ITC----- WYQ <del>Q</del> KP GKAPKLLIY -- ----  |
|                             | 61                      71                      81                      91                      101                       |
| Mouse                       | SISG I PS RFSGSGSGTD FTL <del>S</del> INSVET EDFGMFFC <b>QQ</b> SNSWPYTFGG GTKLEIKR<br>* * * * *                          |
| Hum19                       | SISGVPS RFSGSGSGTD FTLTISSLQP EDFATYYC <b>QQ</b> SNSWPYTFGQ GTKVEIKR  |
| Hum $\kappa$ I              | ---GVPS RFSGSGSGTD FTLTISSLQP EDFATYYC --- -----FGQ GTKVEIKR  |

The CDR residues as defined by both Kabat and Chothia are shown in boldface.

**Figure 4. cDNA Sequences of Humanized scFv3 (Hum3) [SEQ ID. 2].**

The restriction sites are underlined. CCATGG NCO I SITE; GGATCC BAMH I SITE; GTTAAC HPA I SITE

CGAACCATGGGCGATATCcgatgACCCAATCTCCGtctagcCTGAGCgccAG  
TgttGGTgatCGAGTTaccattactTGCCGCGCCAGCCAATCTATCAGTAATAATCTTC  
ACTGGTATCAACAAaaaccgggtaaagctCCGaaaCTTCTTATCAAACACGCCTCTCAG  
AGCATTAGCGGCggtCCGAGCCGCTTCTCTGGCTCTGGCTCGGGCACGGACTTT  
ACCCTTaccATCAGCTCTcttcagccgGAAGACtttGCCaccTATtatTGTCAGCAGTCTAA  
TAGCTGGCCGTATACCTTCGGTcaaGGTACCAAGgtcGAGATTAAGCGCGGCGG  
TGGCGGTTCTGGTGGCggtgtagcggtaggcGGTGGATCCGGTGGCGGTGGCAGCGA  
AGTTCAACTTGTTGAGTCTGGTGGCGGTCTGGTTCAGCCGGGTGGCTCTCTGC  
GCCTGTCTTGCGCAGCAAGCGGTTTCAACATTAAGGACACCTACATCCATTGG  
atgAGGCAAGCTCCGGGTAAGGGTCTGGAGTGGGTGGCACGTATCGACCCGGC  
AAACGACAACACCATTTACGATCCGAAGGTGCAGGGCCGTTTTACTatgTCTGC  
GGACacCTCTAAGAACACCGCGTACCTTCAGATGAACTCTCTGCGTGCCGAGG  
ACACCGCCGTCTACTACTGCACGACCTCTGGCTACTGGTTTGCCTACTGGGGC  
CAGGGCACGCTTGTCACCGTCTCTTCTGGTTaACCC

**Figure 5. Protection of HRV15 infection by mouse 1A6 scFv (Ms1) and humanized 1A6 scFv proteins (Hs3, 4, 7, 17, 18, 19 and 21).**

